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An understanding of the differential roles played by emotions and cognitions in child anxiety cannot be abstracted from the existing literature. The current study sought to delineate the relationship between cognitive development and the experience of anxiety in children by examining emotion understanding, cognitive errors, verbal ability, and non-verbal ability in relation to child general and social anxiety. Results indicate the relationship between emotion understanding and child anxiety varied for high and low abstract reasoning groups. Emotion understanding and cognitive errors were also more strongly related to social anxiety than general anxiety. Furthermore, verbal abilities were correlated negatively with anxiety and correlated positively with emotion understanding. Limitations and suggestions for future research are discussed.

CHILD ANXIETY: HOW DOES COGNITIVE DEVELOPMENT INFLUENCE
THE ROLE OF COGNITIVE ERRORS AND
EMOTION UNDERSTANDING?

by

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CHAPTER I

INTRODUCTION

Despite the frequency of child anxiety symptoms, conceptualization and treatment continue to be based largely on adult research, without conclusive evidence that children's experiences of anxiety are analogous. This situation is true for child general anxiety—excessive and uncontrollable worry regarding many events or activities (e.g., Pina, Silverman, Alfano, & Saavedra, 2002), as well as child social anxiety—the fear of social or performance situations in which embarrassment may occur (e.g., Taylor & Wald, 2003). In particular, many aspects of the cognitive and emotional components of children's general and social anxiety, as well as relevant developmental issues, remain unclear.

Age influences the experience and manifestation of anxiety. Although typical onset for many anxiety disorders occurs in early adulthood, age of onset differs among anxiety disorders. Social anxiety concerns typically begin in late childhood and early adolescence, whereas generalized anxiety disorder typically appears during early adulthood (Scheibe & Albus, 1992). Despite frequent adult onset, anxiety disorders are the most common child psychiatric disorders (Craske, 1997).

Symptoms of anxiety also vary for children of differing ages (Last, 1992). Specifically, symptoms such as cognitive errors are correlated positively with anxiety in older children (Weems, Berman, Silverman, & Saavedra, 2001), but findings are mixed

for younger children (Alfano, Beidel, & Turner 2002). Although age differences in anxiety have been examined, cognitive development also has important implications for anxiety. Before higher-level cognitive abilities are developed, such as the ability to think abstractly, children may be less likely to experience anxiety in the same manner as adults (Weems et al., 2001).

Although cognitive errors (e.g., personalization) and negative thought patterns have been shown to precipitate and maintain anxiety in adults and adolescents, these relationships have not been supported conclusively by child research. In fact, children seven years and younger may not even be able to adequately differentiate between cognitions and emotions (Alfano, Beidel, & Turner, 2002). Understanding and differentiating emotions has important implications for social interactions, suggesting that these constructs should both be examined in relation to child social and general anxiety (Izard, 1971). The current study, therefore, examined the interplay between child cognitive errors, emotion understanding, and cognitive development, in relation to child general and social anxiety.

Cognitions

In the child anxiety literature, the term “cognition” generally encompasses two components—cognitive process and cognitive content. Cognitive process refers to a child’s general schema, or the way a child views and understands the world, whereas cognitive content refers to the child’s actual thoughts (Alfano et al., 2002). For example, a child presenting in class may think that everyone is laughing at him; this thought is the cognitive content. The mental procedure that produces the thought is the cognitive

process; it is during this process that cognitive errors occur. Cognitive errors are evident in the content, or the resulting thoughts. This study examined differences in children's anxiety-related cognitions using measures to assess both cognitive content and cognitive errors.

Beck (1976) proposed a model of the development and maintenance of depression and anxiety in adults that is based on the existence of negatively biased thinking styles. Overgeneralization, selective abstraction, catastrophizing, and personalizing are among the cognitive errors he asserted perpetuate anxiety. Overgeneralization is one's belief that the same negative outcome will occur in all similar situations. For example, if a child is selected last for a kickball team, then he may think he will be the last choice every time teams are picked. Selective abstraction occurs when one gives attention only to the negative aspects of a situation. In a similar situation, a child who is picked third may only focus on the fact that she was not selected first, instead of the fact that she was not chosen last. Catastrophizing occurs when people think the worst possible outcome will occur (e.g., "If I am picked last for the kickball team, then everyone will think that I am a dork and I will never have any friends ever again"). Finally, personalizing occurs when a person attributes the cause of a negative event to himself. For example, if a child is picked last for kickball, then he may think it is because he is a horrible athlete. Cognitive errors can be conceptualized as either the types specified by Beck (1976) or as an overall increased number of negative thoughts (e.g., interpreting neutral situations in a negative way).

Cognitive errors influence the etiology and maintenance of adult anxiety (e.g., Clark & Beck, 1988). Children also commit cognitive errors; previous research indicates that children with general anxiety interpret ambiguous situations negatively more often than do comparison groups of externalizing and average children (Bogels & Zigterman, 2000). Correspondingly, children with anxiety report negative cognitions more frequently than do children without anxiety (Alfano et al., 2002).

The study of cognitive errors and negative cognitions has received less attention in the child social anxiety literature; however, research indicates negative cognitions are also relevant to social anxiety. For example, children with social anxiety appraise their social abilities more negatively than does an observer (Cartwright-Hatton, Hodges, & Porter, 2003) and adolescents with social anxiety expect worse outcomes in a negative social situation than do adolescents with lower levels of social anxiety (Magnusdottir & Smari, 1999). These studies examined negative cognitions as increases in negative appraisals and expectancies; the current study examined specific negative thought patterns through measuring cognitive errors.

Of note, a few studies examining negative cognitions in children with anxiety have found mixed and contradictory results. Prins and Hanewald (1997) found that children with high levels of general anxiety report more negative cognitions than do children with low levels of anxiety. Although this difference was statistically significant, it may lack clinical importance because the difference between the two groups consisted of only one negative thought. In addition, Beidel (1991) found no difference between the

number of negative cognitions reported by anxious and non-anxious children when presented with hypothetical anxiety provoking scenarios.

These incongruent findings may highlight a potential difference between childhood and adult manifestations of anxiety that warrants further exploration. On the other hand, these contradictory results may stem from the use of different methods of soliciting and coding child cognitions. Four main types of assessment have been used to examine children's cognitions: sampling, endorsement, recording, and production methods (Kendall & Hollon, 1981). Sampling methods examine children's thoughts at random time intervals. Endorsement methods, such as questionnaires, involve children selecting what they are thinking from a self-statement list. These measures have been shown to be good predictors of task performance (Prins & Hanewald, 1997). Recording methods use "think aloud" measurement by audio taping verbalizations before or during a task. Think aloud methods generally yield more analytic cognitions than other methods because they access thoughts from short-term memory during the problem-solving task (Lodge, Harte, & Tripp, 1998). Production methods, such as thought listing tasks, analyze the content of thoughts recalled immediately after a task. Verbal thought listing procedures are less likely to interfere with the child's completion of the task and produce more positive and negative cognitions (Alfano et al., 2002). Each of these methods has benefits and drawbacks and could result in differential reporting of cognitions; clearly, assessment measures should be chosen based on the specific purpose of an assessment.

The timing of inquiry could also influence findings; for example, research using production methods has shown that anxiety experienced in anticipation of an event may

involve more negative cognitions for high anxious than low anxious children. This difference, however, disappears when children actually perform an anxiety-provoking task. This finding is noteworthy because children report being the most nervous during an anxiety-provoking task, but they report fewer negative cognitions than when they are anticipating the task (Kendall & Chansky, 1991).

The relationship of negative cognitions to child anxiety is likely influenced by cognitive development. Weems and colleagues (2001) found age moderated the relationship between anxiety and cognitive errors. Their study divided the sample into two groups of children (ages 6 to 11 years and 12 to 17 years); results suggest that cognitive errors are related increasingly to anxiety over time. Specifically, children in the younger group exhibited catastrophizing and personalizing more often than did children in the older group, who were more likely to exhibit overgeneralization and selective abstraction. Although this shift could be attributable to mere maturation, other developmental changes are likely at play as well. For example, as children develop, their cognitive abilities generally increase correspondingly; therefore, underlying cognitive capabilities may influence the thoughts of anxious children.

The current study proposed negative cognitions are related to child anxiety—with a stronger relationship as cognitive development increases. Children with greater cognitive abilities can think abstractly, which implies that they can generate more positive and negative possible outcomes for an event. Children who have experienced negative events, modeling, or other influential factors, may derive more negative thoughts; the likelihood of these children accepting these cognitive errors would seem to

increase as well. As children develop, their non-verbal (abstract reasoning) abilities develop, which may have implications for child anxiety.

Also relating to child anxiety, children's verbal abilities increase they develop; Toren and colleagues (2000) found verbal ability is related negatively to anxiety in children and suggested that anxiety hinders "the mastery of linguistic information." Their study suggested anxiety is a verbal task that can increase the amount of information being processed, therefore decreasing performance on verbal tasks. Verbal and non-verbal abilities, however, are also correlated positively with coping (Plante & Sykora, 1994), which suggests children with increased verbal skills may also have better developed coping skills. Children's verbal abilities may relate to anxiety because increases in coping may counteract one's susceptibility to anxiety due to increased abstract reasoning abilities.

One goal of the present study was to clarify the relationship between cognitive development and cognitive errors within the context of child anxiety; specifically, an interaction between cognitive errors and cognitive development was expected.

Cognitive Development

The relationship between cognitive development and anxiety was examined to understand how children with differing cognitive abilities report and experience anxiety. Piaget conceptualized cognitive development as occurring in stages; when children reach a specific stage, their thinking and behavior are hypothesized to reflect their underlying mental capabilities and thought structures (Halford, 1989). Piaget delineated stages of cognitive development from infancy to adulthood. Relevant to the current study, he

theorized that prior to the formal operational stage—approximately 11 or 12 years of age—children have not developed the ability to examine internal and immediate stimuli and associate them with possible future external dangers (Piaget, 1971; Richardson & Sheldon, 1988). Although Piaget’s stage theory has been influential, it has also been criticized because of its fundamental additive nature and notion of cognitive development occurring in abrupt transitions. Further research has confirmed constraints in cognitive processing of children at various ages but suggests Piagetian tasks may underestimate children’s abilities (Halford, 1989).

Despite theoretical criticisms, Piagetian tasks are often used to measure cognitive development; in fact, more than twenty-five different tasks have been used (Flieller, 1999). Specific tasks are selected to detect differences between cognitive developmental stages. Not all tasks are administered using a consistent technique; notably, performance on Piagetian tasks varies based on the method of administration (Carlson & Dillon, 1979). These limitations hinder the examination of cognitive development using Piagetian tasks in a standardized study with a wide age range. Other measures do not possess these limitations and assess skills similar to those examined using Piagetian tasks; the current study used the Kaufman Brief Intelligence Test- 2nd edition (KBIT-2), which maps on to Piagetian cognitive development in many ways.

The Kaufman Brief Intelligence Test- 2nd edition and many current intelligence measures are based on Cattell & Horn’s (1978) theory, which describes two general types of intelligence: fluid intelligence—basic information processing and abstract reasoning skills, and crystallized intelligence—the ability to apply acquired knowledge. Fluid

reasoning, measured by non-verbal scales, is less dependent on educational factors and experience, whereas crystallized intelligence, measured by verbal scales, significantly varies based on culture and experience (Rubin, Brown, & Priddle, 1978). Despite varied theoretical bases, Piagetian tasks are correlated positively with general measures of intelligence, such as the Wechsler Intelligence Scale for Children. Specifically, Piagetian tasks are more strongly correlated with assessments of non-verbal skills than verbal skills (Neisser, 1997) and purport to measure fluid intelligence. The current study, therefore, used the non-verbal scale on a standardized intelligence measure (KBIT-2) to examine cognitive development.

A child's experience and understanding of the world relies on his cognitive abilities; cognitive development, therefore, likely affects a child's experience of anxiety and understanding of emotions. Because children of the same chronological age can have different cognitive abilities, this study examined the latter to ensure measured differences were related to cognitive development rather than mere physical maturation. By examining child anxiety with cognitive abilities, the current study sought to identify differences in anxiety based on cognitive development.

Differences in Cognitive Development and the Reporting of Children's Anxiety

Children sometimes "confound emotions" when they can not distinguish between their emotions and cognitions. Children younger than seven years are more likely than older children to make such a mistake by stating an emotion (e.g., I feel scared) when asked about their cognitions (e.g., What are you thinking?) (Alfano et al., 2002; Stone & Lemanek, 1990). Although this trend (i.e., differential reporting of anxiety in younger

compared to older children) has been noted in the current literature, further research should explore the implications of cognitive development. Specifically, being able to understand the distinction between and functions of cognitions and emotions may assist children in monitoring and regulating their corresponding experiences; these skills are encompassed in the construct of emotion understanding (Flavell, Flavell, & Green, 2001). Thus, the current study examined emotion understanding and cognitions, and how they differ based on cognitive development in the context of child anxiety.

Emotion Understanding

Emotion understanding is knowledge about one's own and other's feelings. This knowledge provides children with the skills needed for emotional communication and successful social relationships (Izard, 1971). Emotion understanding is correlated positively with social competence and positive peer relationships (Hubbard & Coie, 1994), self-regulation (Schultz, Izard, Ackerman, & Youngstrom, 2001) and academic competence (Izard, Fine, Mostow, Ackerman, & Youngstrom, 2001), and correlated negatively with internalizing behaviors (Fine, Izard, Mostow, Trentacosta, & Ackerman, 2003) and social withdrawal (Schultz et al., 2001).

Anxiety is intricate—it often involves many emotions, such as worry and embarrassment. Children's understanding develops more slowly for complex emotions such as pride, shame, and embarrassment (Harris, 1993). Emotion understanding skills, therefore, may be acquired more slowly in children experiencing anxiety. Emotion understanding is salient to anxiety because symptoms, such as worry and excessive or unreasonable fear, are often caused by unregulated emotions—one type of emotion

understanding deficit (Southam-Gerow & Kendall, 2000). Schultz and colleagues (2001) examined the pathway between deficits in emotion knowledge and social withdrawal—a component of social anxiety—and found that peer rejection served as a mediator between emotion knowledge and social withdrawal. Furthermore, deficits in social competence have been shown to initiate and perpetuate psychopathology in children (Hubbard & Coie, 1994).

Four areas of children's emotion understanding have been studied most often: cues for feelings, simultaneous emotions, hiding emotions, and emotion regulation. Research by Southam-Gerow and Kendall (2000) and Schultz and colleagues (2001) explicitly links emotion understanding deficits and child anxiety through findings that children with anxiety show a marked decrease in their ability to regulate and hide their emotions. Thus, deficits in these two areas seem to be uniquely related to child anxiety.

The ability to hide one's emotions rests on an understanding of display rules; these rules govern what emotions are acceptable to exhibit in specific social situations (Hubbard & Coie, 1994). A child's ability to hide her emotions may protect her from certain painful feelings such as embarrassment. For example, if a child who must give a class speech becomes nervous and starts to cry, then she has not recognized the implicit display rules of the situation that signal her behavior is socially unacceptable. Understandably, this situation may result in negative social experiences such as shame, embarrassment, and further social withdrawal.

Emotion regulation represents a child's ability to change her emotional responses in specific situations (Hubbard & Coie, 1994). The ability to regulate emotions enables

children to recognize their emotions and adaptively alter their response. Continuing the previous example, if the child possesses good emotion regulation, then she can alter her emotions in an adaptive manner by not crying and therefore not experiencing a negative social situation. Understanding one's emotions and thus being able to control and alter responses will allow the child to behave in accordance with social expectations. Although restraint of emotion may not be inherent for children, social expectations mandate development of control of emotion expression (Izard, 1971). Correspondingly, research has shown a positive correlation between teacher ratings of boys' ability to cope with negative emotions constructively and their teacher reported social status (Hubbard & Coie, 1994). Hubbard and Coie's (1994) report that the delayed development of emotion understanding is correlated with a decrease in social acceptance supports the link between emotion understanding deficits and anxiety.

Children with emotion understanding deficits, as described above, are more likely to experience social consequences. Correspondingly, emotion understanding is correlated positively with adaptive social behavior and negatively with internalizing behaviors (Schultz et al., 2001). Social consequences may result from emotion understanding deficits; the current study, therefore, hypothesized a stronger correlation between social anxiety and emotion understanding than between general anxiety and emotion understanding. Child social anxiety—fear or avoidance of social evaluative situations—likely involves peers. Therefore, children with social anxiety may be more affected by emotion understanding deficits because of resulting social consequences.

Purpose of the Present Study

The current study simultaneously examined the interplay of emotion understanding, cognitive errors, and cognitive development in relation to child anxiety. The primary goal of this study was to identify differences in emotion understanding and anxious cognitions of children with varying cognitive abilities. Although many studies have investigated these factors separately, to our knowledge, research on how they contribute collectively to child anxiety has not been conducted. Examining differences in the report of anxiety based on cognitive development will help clarify factors relevant to child anxiety.

Hypotheses examined differences in child anxiety based on cognitive development (abstract reasoning), emotion understanding, and cognitive errors. First, a positive correlation between general and social anxiety and abstract reasoning was posited. Second, abstract reasoning was expected to be associated negatively with the number of emotions children reported on the thought-listing task; an interaction was hypothesized based on general and social anxiety. Third, abstract reasoning was predicted to be associated positively with cognitions reported on the thought-listing task. These hypotheses examined child reports of general and social anxiety relative to cognitive development.

The fourth hypothesis posited emotion hiding and regulation, aspects of emotion understanding related inversely to anxiety (Hubbard & Coie, 1994), would be negatively associated with abstract reasoning. Fifth, cognitive errors were hypothesized to correlate positively with abstract reasoning. An interaction for general and social anxiety was

predicted for both hypotheses. These hypotheses examined the effects of emotion understanding deficits and cognitive errors relative to cognitive development.

The final hypothesis examined the relationship between emotion understanding and general and social anxiety; a stronger correlation between emotion understanding and child social anxiety than emotion understanding and child general anxiety was predicted. Children with anxiety may be less able to regulate and hide their emotions (Southam-Gerow, & Kendall, 2000) and therefore more likely to experience social consequences. Due to the nature of social anxiety, this study predicted children with social anxiety are more affected by emotion understanding deficits.

CHAPTER II

METHOD

Participants

Participants were 85 children ages 6 to 14 years from either a local private school ($n = 49$), a public school ($n = 26$), or a community based after school care program ($n = 10$). There were approximately equal numbers of boys ($n = 43$) and girls ($n = 42$). The sample was primarily Caucasian (92%). See Table 1 for demographic information. An a priori power analysis suggested approximately 84 participants would be sufficient to detect an expected medium effect size.

Materials

Multidimensional Anxiety Scale for Children (MASC; March, 1997). This scale is a self-report measure that examines major dimensions of anxiety in children. Thirty-nine items comprise four subscales that are typically used to calculate the total anxiety score for each child. These subscales include: Physical Symptoms (tenseness and somatic symptoms), Social Anxiety (humiliation and performance fears), Harm Avoidance (perfectionism and anxious coping), and Separation Anxiety/ Panic. The MASC includes questions such as, "I feel tense or uptight," with each item scored 0- never true about me, 1-rarely true about me, 2-sometimes true about me, or 3-often true about me. Because social anxiety is also of specific interest in this study, only the Physical Symptoms, Harm Avoidance, and Separation Anxiety subscales will be used to examine general anxiety in

children to reduce overlap between measures and provide more accurate comparisons between child general and social anxiety.

The MASC has good test-retest reliability, ($r = .79$ and $.93$ for 3 weeks and 3 months respectively; March, Parker, Sullivan, Stallings, & Conners, 1997). This measure has good total internal consistency ($\alpha = .90$) and strong internal consistency for physical symptoms ($\alpha = .85$), harm avoidance ($\alpha = .74$), social anxiety ($\alpha = .82$), and separation anxiety ($\alpha = .75$). Convergent validity was examined through comparison with the Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1978); the correlation ($r = .73$) between the MASC total and RCMAS total signified good validity.

Social Phobia and Anxiety Inventory for Children (SPAI-C; Beidel, Turner, & Morris, 1998). This measure assesses social anxiety in children. 26 items assess the child's distress level across various social situations (e.g., "I feel scared when I have to join in a social situation with a large group of boys and girls). The SPAI-C is scored based on the child's responses (0 = never or hardly ever, 1 = sometimes, or 2 = most of the time or always). The score for each question is summed, with a total score over eighteen suggesting possible social phobia. This measure exhibits excellent internal consistency ($\alpha = .95$) and good test-retest reliability ($r = .86$ for two weeks; Beidel, Turner, & Morris, 1995). The SPAI-C has been shown to differentiate children with social anxiety from children with externalizing disorders as well as average children ($F [2,125] = 29.79, p < .001$), thus exhibiting discriminant validity. To examine convergent validity, the SPAI-C has been compared to daily diaries, which track a child's socially distressing events, the

location of those events, and the behavioral response to those events. Correlation with distress ratings from these diaries and SPAI-C scores are moderate ($r = .41, p < .07$).

Children's Negative Cognitive Errors Questionnaire (CNCEQ; Leitenberg, Yost, & Carroll-Wilson, 1986). This measure assess four principal cognitive distortions: catastrophizing, overgeneralization, personalizing, and selective abstraction. The 24 items present the child with hypothetical situations followed by a negative interpretation (e.g., You play basketball and score 5 baskets but missed two real easy shots. After the game you think, "I played poorly"). The child then rates on a 5-point scale how similar this thought would be to his or her own thought (1 = not at all like I would think, 5 = almost exactly like I would think). This measure has acceptable test-retest reliability ($r = .65$ for a 4-week interval; Leitenberg, Yost, & Carroll-Wilson, 1986). The measure's overall internal consistency is good ($\alpha = .89$) and ranges from .60 to .71 for the four types of errors. Although the internal consistency for the subtypes is not particularly strong, this measure is one of the most commonly used for anxiety research.

Kusche Affective Interview-Revised (KAI-R; Kusche, Beilke, & Greenberg, 1988). This measure examines six aspects of children's emotion understanding: changing emotions, hiding emotions, experiencing simultaneous emotions, identifying emotions, giving examples of emotions, and recognizing other's emotions. A sequence of open-ended questions is used; for example, the child is asked, "Can you change your feelings?" The child is encouraged to give more than one answer to the question. Responses are recorded verbatim by the examiner and subsequently coded according to criteria specified in a manual by Kusche, Beilke, & Greenberg (1988). Although this scale has not been

published, it is currently the best available interview measure of emotion understanding in children and has been used in several previous published studies (e.g., Cook, Greenberg, & Kusche, 1994; Seja & Russ, 1999; Southam-Gerow & Kendall, 2000). Inter-rater reliability for the measure ranges from .80 to .95 (Cook et al., 1994; Cook).

Thought Listing Procedure. All children participated in a thought listing procedure to record the content of their thoughts when faced with hypothetical anxiety provoking situations. During the thought listing task, children were read vignettes and asked to report what would be “going through their mind” during and after they were in this situation. Research assistants coded reactions based on the content of each response to differentiate cognitions (e.g., They don’t like me) from emotions (e.g., I feel scared). Cognitions reported were then coded as anxious versus non-anxious; emotions were coded as positive, angry, sad, anxious, and other. This thought listing task was adapted from similar tasks (e.g., Cacioppo & Petty, 1981); each scenario was piloted for this study by reading the situations to children and researchers to ensure clarity.

Verbal thought listing procedures are a valid method of assessing a child’s cognitions because they are less likely to interfere with the child’s completion of the task and they produce more positive and negative cognitions (Alfano et al., 2002). The superiority of thought listing as a measure of child anxiety has been questioned when compared to questionnaires or self-statement inventories (Prins & Hanewald, 1997). Concerns pertain to the predictive value of verbal thought listing tasks, which is not pertinent to the current study.

Kaufman Brief Intelligence Test-2nd edition (KBIT-2; Kaufman & Kaufman, 2004).

This measure is a brief intelligence assessment that is comprised of verbal and non-verbal composites: vocabulary (expressive vocabulary and definition components examine knowledge and understanding of words) and matrices (examines the child's ability to solve new problems through completing analogies and abstracting relationships between objects). The current study used the non-verbal subscale to assess abstract reasoning abilities. This scale represents fluid intelligence, which is related to Piagetian measures of cognitive development and is relatively unaffected by cultural factors (Rubin, Brown, & Priddle, 1978). Test-retest reliability for the subtests and the full scale vary somewhat depending on age, ranging from .86 to .97 for the vocabulary subtest, .80 to .92 for the matrices subtest, and .92 to .95 for the IQ composite. This measure also has good internal consistency ($\alpha = .93, .88, \text{ and } .94$, for the vocabulary, matrices, and IQ Composite respectively).

Procedure

Consent forms were handed out to all children in participating classrooms; children could be a part of the study once written parental consent and child assent were obtained. All data collection was conducted on site. Children were administered the MASC, SPAI-C, CNCEQ, KAI-R, thought listing procedure, and the K-BIT-2. Measures were counterbalanced to control for order effects. Graduate students and well-trained undergraduate research assistants administered the first five measures by reading each question aloud; only trained and supervised clinical psychology graduate students

administered the K-BIT-2. All undergraduate research assistants were blind to the specific study hypotheses.

Children's responses on the thought listing task and Kusche Affective Interview-Revised (KAI-R) were audio recorded and transcribed. Responses on the KAI-R were coded in accordance with Carroll and Steward's (1984) guidelines. Responses on the thought-listing task were coded based on emotions versus cognitions reported, type of emotions (in accordance with KAI-R coding), and type of cognitions (anxious versus non-anxious).

CHAPTER III

RESULTS

Cronbach's alphas were computed for all relevant scales (CNCEQ, MASC, and SPAI-C) and ranged from .91 to .96, which are comparable to published norms. Means and standard deviations for all measures are depicted in Table 2 and are similar to those obtained from normative samples.

Possible differences between data collection sites were examined, focusing on main study variables. Specifically, a Multivariate Analysis of Variance (MANOVA) tested between subjects effects for age, verbal abilities, and non-verbal abilities. The MANOVA indicated significant between group differences (Table 3), $F(6, 84) = 5.48, p = .0001$; specific differences are depicted in Table 4. A Multivariate Analysis of Covariance (MANCOVA) was subsequently computed to control for the effects of age on group differences for verbal and non-verbal ability; this analysis indicated differences remained, $F(8, 84) = 4.23, p = .0001$. Specifically, between group differences persisted for verbal raw ($F[2, 84] = 6.35, p = .003$) and but not non-verbal raw scores ($F[2, 84] = 2.24, p = .11$).

Table 5 presents zero-order correlations between the main study variables. The results illustrate significant correlations of verbal raw abilities to social anxiety, emotion understanding, and number of emotions reported. Correlations of verbal raw abilities to general anxiety scores ($r = -.21, p = .056$) and number of cognitions reported ($r = .21, p =$

.053) approached significance. Abstract reasoning abilities were not correlated with main measures (hypothesis 1); however, the correlation of abstract reasoning ability to reported emotions ($r = -.18, p = .09$) and cognitions ($r = .19, p = .08$) approached significance (hypothesis 2). Furthermore, social anxiety correlated positively with reported emotions and correlated negatively with reported cognitions on the thought-listing task. In addition, cognitive errors correlated positively with social anxiety (hypothesis 5). These relationships were not significant for general anxiety.

Cognitions and Emotions

Variations in children's experiences and reports of anxiety were indicated by the negative correlation between emotions and cognitions reported on the thought-listing task. This study sought to identify variables involved in these variations. Analyses indicated that emotion understanding is correlated positively with total cognitions reported and is correlated negatively with total emotions reported.

Differences were expected between predictors of reported emotions versus cognitions. Emotion understanding represents many types of knowledge about emotions, including the ability to differentiate between emotions and cognitions. Therefore, children who reported emotions on the thought listing task may have lower emotion understanding abilities. General and social anxiety were predicted to vary based on emotion understanding due to social consequences often encountered for children with emotion understanding deficits. Predictors of reported emotions and cognitions, therefore, were also hypothesized to vary for general and social anxiety (hypothesis 6). Separate regression analyses were conducted for each type of report. Results examining variance

accounted for by social anxiety after entering general anxiety indicated social anxiety accounts for additional variance in total emotions reported, $F(2, 84) = 8.14, p = .001$ (see Table 6). When predicting number of reported cognitions, general anxiety contributed significant variance after entering social anxiety $F(2, 84) = 10.28, p = .001$. Of note, general anxiety positively predicted reported cognitions and negatively predicted reported emotions, whereas social anxiety positively predicted reported emotions and negatively predicted reported cognitions.

Due to the theoretical connection between emotion understanding and reported emotions and cognitions, variance explained by emotion understanding was also examined. Results indicated social anxiety accounted for significant variance after entering demographic variables (ethnicity, sex), emotion understanding, and general anxiety into the regression model, $F(5, 84) = 5.2, p = .0001$ (see Table 7). General anxiety also accounted for variance in reported cognitions over and above ethnicity, sex, emotion understanding, and social anxiety, $F(5, 84) = 6.6, p = .0001$. Again, these results indicate a unique relationship between child social anxiety and reported emotions, as well as between child general anxiety and reported cognitions.

Sex Differences

Differences for emotions and cognitions reported also varied based on sex; boys ($M = 3.12$) reported significantly more emotions than girls ($M = 1.83$) when given hypothetical anxiety provoking scenarios, $F = 3.96, p = .05$. Differences in reported cognitions (boys $M = 8.8$, girls $M = 9.95$; $F = 3.29, p = .07$) and general anxiety (boys $M = 32.42$, girls $M = 37.95$; $F = 3.54, p = .06$) approached significance. Of note, these

differences in emotions and cognitions reported were not accompanied by sex differences in emotion understanding, abstract reasoning ability, verbal ability, or social anxiety. When examining categories of emotions reported, boys reported more anxious emotions ($M = .86$) than girls ($M = .52$), whereas girls reported more positive emotions ($M = .12$) than boys ($M = .07$). The overall reporting of emotions is also important; sixty-four percent of the sample reported fewer than 2 emotions across all 12 prompts on the thought-listing task. This study, therefore, can draw limited conclusions regarding the clinical significance and implications of emotions reported.

Emotion Understanding

Emotion understanding is correlated positively with verbal abilities. With regard to specific subtypes of emotion understanding, verbal ability is related positively to children's knowledge of cues of emotions ($r = .21, p = .05$) and understanding of multiple emotions ($r = .23, p = .03$). Verbal abilities were not related to the other two subtypes of emotion understanding—knowledge of hiding emotions ($r = .10, p = .35$) and changing emotions ($r = .02, p = .86$).

Abstract reasoning was predicted to relate to emotion understanding (hypothesis 4), and emotion understanding was predicted to vary between general and social anxiety (hypothesis 6). Therefore, regression equations calculated the contribution of emotion understanding to social anxiety and general anxiety; an interaction between abstract reasoning abilities and emotion understanding was expected and examined. However, emotion understanding, abstract reasoning, and the interaction between these variables

were not significant predictors of child social anxiety ($F [3, 84] = .56, p = .64$) or child general anxiety ($F [3, 84] = .44, p = .72$).

Although statistically less powerful than regression analyses, group comparisons were also computed to examine these data. Because of the exploratory nature of these analyses, a significance level of .1 was used as a cutoff; this level will apply to other analyses of this type. Children in the top 1/3 and bottom 1/3 of non-verbal scores were placed into extreme groups. The high abstract reasoning group consisted of 27 children with a non-verbal score of 34 or higher. The low abstract reasoning group included 27 children with a non-verbal score of 28 or lower. Analyses revealed a negative correlation between emotion understanding and social anxiety in the high abstract reasoning group ($r = -.34, p = .08$; hypothesis 4). In addition, abstract reasoning was correlated positively with knowledge of hiding emotions ($r = .51, p = .007$); these relationships were not significant for children in the low abstract reasoning group. Furthermore, emotion understanding correlated positively with non-verbal reasoning in the low abstract reasoning group ($r = .42, p = .03$); this relationship was not significant for children in the high abstract reasoning group ($r = .25, p = .21$). These results support differences in the role of emotion understanding at varied levels of cognitive development.

Cognitive Errors

Correlations indicated verbal and abstract reasoning skills were not related to cognitive errors (hypothesis 5). Previous research indicates a positive relationship between age and cognitive errors (Weems et al., 2001). Therefore, age differences were also examined to determine whether the current sample deviates from previous research

or whether the relationship between cognitive development and cognitive errors varies from that between age and cognitive errors. The correlation between age and cognitive errors in the current sample indicated a positive trend ($r = .18, p = .11$), which is consistent with the literature.

Older and younger age groups were also examined for differences in cognitive errors. The older age group consisted of 27 children ages 11 years and above, and 27 children below age nine years comprised the younger age group. A Univariate Analysis of Variance was conducted to examine differences on cognitive errors. The results indicate that older children ($M = 6.9$) commit more cognitive errors than do younger children ($M = 4.8$), $F(1, 53) = 3.99, p = .05$ (hypothesis 5). Differences for specific types of cognitive errors are depicted in Table 8.

Cognitive errors were correlated positively with social anxiety. Regression analyses indicated cognitive errors remained a significant predictor of social anxiety after entering ethnicity, sex, verbal ability, and abstract reasoning ability, $F(5, 84) = 2.3, p = .05$ (See Table 9). The zero-order correlation between cognitive errors and general anxiety was not significant; therefore, regression analyses including the above factors confirmed cognitive errors were not a significant predictor of general anxiety.

The role of cognitive errors for general and social anxiety was predicted to differ based on abstract reasoning abilities; therefore, regressions were computed containing an interaction term. A trend suggested cognitive errors, non-verbal ability, and the interaction between these two variables may predict social anxiety, $F(3, 84) = 2.3, p = .08$; however, examining individual predictive values indicated that these variables do not

predict social anxiety or general anxiety, $F(3, 84) = .16, p = .92$ (see Table 10).

Curvilinear equations were also computed to further explore the relationship between cognitive errors and anxiety. Results indicated that a quadratic model did not fit the data for either general or social anxiety and that these models are best conceptualized using a linear model.

Although overall regressions were not significant, exploratory analyses were conducted examining cognitive errors in high and low abstract reasoning groups separately. In the high group, cognitive errors remained a significant predictor of social anxiety after accounting for the variance due to sex, verbal raw ability, and emotion understanding $F(4, 26) = 3.34, p = .03$ (See Table 11). This relationship approached significance for general anxiety $F(4, 26) = 2.28, p = .09$. In the low abstract reasoning group, after accounting for variance due to sex, verbal ability, and cognitive errors, emotion understanding did not predict general anxiety ($F[4, 26] = 1.19, p = .34$) or social anxiety, ($F[4, 26] = .30, p = .88$). These data indicate that different predictors are likely relevant for social versus general anxiety based on cognitive development.

Cognitions stated by children on the thought listing task are evidence of their cognitive processes. Cognitions reported were coded as anxious versus non-anxious; for example, thoughts reported that reflected fear of negative outcomes were coded as anxious, whereas thoughts not reflecting worry were coded as non-anxious. Anxious cognitions reported were not significantly related to cognitive errors, yet are thought to be the result of cognitive errors. Emotion understanding is correlated positively with anxious cognitions reported ($r = .34, p = .002$). A regression analysis indicated emotion

understanding remains a significant predictor of reported anxious cognitions after accounting for sex, age, verbal ability, and non-verbal ability $F(5, 84) = 2.32, p = .05$. This finding likely relates to the positive correlation of total reported cognitions and emotion understanding. An ANOVA indicated a trend in negative cognitions between high ($M = 7.5$) and low ($M = 6.13$) abstract reasoning ability group, $F = 2.12, p = .15$.

Cognitive Development and General versus Social Anxiety

Regression analyses examined abstract reasoning as a predictor of general and social anxiety; after controlling for ethnicity and sex, abstract reasoning did not predict general anxiety ($F[3, 84] = 1.16, p = .33$) or social anxiety ($F[3, 84] = .48, p = .69$). As noted previously, sex, verbal ability and cognitive errors predict social anxiety; whereas only sex and verbal ability predict general anxiety.

Differences in verbal and non-verbal abilities were examined by forming extreme groups based on tertiles for both general and social anxiety. The high general anxiety group was composed of 27 children who scored over a 42 on the MASC; the low general anxiety group was composed of 27 children who scored below a 29 on the MASC. Similarly, the high social anxiety group was composed of 27 children who scored over a 21.77 on the SPAI-C; the low social anxiety group was composed of 27 children who scored under an 8.37 on this same measure. A Multivariate Analysis of Variance (MANOVA) examined differences between high and low social and general anxiety groups, non-verbal ability, and verbal ability. Overall, no group differences were present for general anxiety groups, $F(2, 31) = 1.5, p = .25$; however, differences existed between social anxiety groups, $F(2, 31) = 3.4, p = .04$. The difference in verbal ability between

high ($M = 52.5$) and low ($M = 67.0$) social anxiety groups is significant, $F(1, 35) = 4.8, p = .04$ indicating children with lower levels of social anxiety have higher verbal abilities than children with high levels of social anxiety. Non-verbal differences were not significant.

CHAPTER IV

DISCUSSION

The current study examined cognitive development and the experience of anxiety in children by measuring emotion understanding, cognitive errors, verbal ability, and non-verbal ability in relation to child general and social anxiety. Findings indicated reported cognitions, reported emotions, and emotion understanding help explain child anxiety—and are particularly important for child social anxiety. Cognitive errors also related to general and social anxiety. The interplay of cognitions and emotions reported, emotion understanding, cognitive errors, and verbal and non-verbal reasoning in relation to child anxiety is discussed.

Cognitions and Emotions

Analyses determined a negative correlation between children's reported cognitions and emotions on a thought-listing task. What influences children's report of cognitions and emotions? This study suggests three factors: emotion understanding, anxiety, and verbal ability.

Emotion understanding, or knowledge of the feelings of one's self and others (Izard, 1971), is likely reflected in children's responses on the thought-listing task. In this study, emotion understanding was correlated positively with reported cognitions and negatively with reported emotions on the thought-listing task. For children, emotions and

cognitions are often blurred; young children often report emotions when asked for cognitions. Acquiring emotion understanding skills enables children to differentiate between emotions and cognitions; therefore, children with a more advanced understanding of their emotions would be more likely to report cognitions rather than emotions on the thought-listing task, which asks for cognitions. Therefore, confounding emotions and cognitions, reflected by reporting emotions on the thought-listing task, indicates children have less developed emotion understanding abilities. Current results support this relationship because children who reported emotions on the thought listing task exhibited less developed emotion understanding skills when assessed using an interview measure.

Understanding emotions and being able to distinguish between one's own emotions and cognitions may help children monitor and regulate their experiences, which may lead to fewer negative social experiences and decreased anxiety (Flavell, Flavell, & Green, 2001). The current study supported a connection between anxiety, emotion understanding, and reporting of emotions versus cognitions because, in addition to emotion understanding, general and social anxiety predicted the report of cognitions and emotions on the thought-listing task. Specifically, social anxiety predicted emotions reported and general anxiety predicted cognitions reported. In fact, social and general anxiety remained significant even after controlling for emotion understanding, indicating they explained unique variance in reporting cognitions and emotions.

When integrating these findings, children who reported emotions exhibited less developed emotion understanding and higher social anxiety, which supports a unique link

between social anxiety and emotion understanding abilities. Children with less developed emotion understanding skills may be more likely to experience negative social outcomes and less able to understand their emotions during these negative events, which may lead to anxiety. Because the consequences of poor emotion understanding are likely to be social in nature, children with less developed emotion understanding may be more likely to develop social versus general anxiety.

Although abstract reasoning was not directly related to reported emotions and cognitions in the current study, confounding emotions has been found to occur more in younger children than older children (Alfano et al., 2002). This relationship corresponds to previous findings that children with social anxiety are often significantly younger than children with generalized anxiety (Mast et al., 2004). The current study found that general anxiety correlated positively with cognitions reported, suggesting that children with higher levels of general anxiety did not confound emotions, reflecting better developed emotion understanding. These findings support differential relationships between social anxiety and emotions and general anxiety and cognitions and suggest cognitive development may play a role in this relationship.

Verbal abilities were also related to emotions and cognitions reported on the thought-listing task. The correlation between verbal ability and reporting emotions is negative, whereas the correlation between verbal ability and stating cognitions is positive. Children with higher verbal skills would be expected to generate more responses; however, the negative relationship between verbal ability and reporting emotions highlights an important difference. The relationship between verbal abilities and

reporting emotions versus cognitions is tied to emotion understanding; interpretations, therefore, are discussed next.

Emotion Understanding

A linear relationship was not found between emotion understanding and child anxiety. Instead, as hypothesized, emotion understanding and child anxiety were related within the context of cognitive development. Specifically, for children with more advanced abstract reasoning, emotion understanding was related negatively to social anxiety. No differences in emotion understanding were found for the low abstract reasoning group, indicating cognitive development influences the relationship between emotion understanding and child anxiety. Having less developed emotion understanding skills is expected for younger children and therefore would not be a risk factor for anxiety. As children develop cognitively, their emotion understanding skills should correspondingly develop.

Emotion understanding develops more slowly for complex emotions, such as anxiety (Harris, 1993). If a child with poor emotion understanding has negative experiences, such as being teased by peers, he is less able to identify, hide, and change his emotions, which will likely influence his response to teasing and future social outcomes. Experiencing negative social situations and complex emotions related to social anxiety, therefore, may impair the normal development of emotion understanding. As children develop cognitively, deficits in emotion understanding skills emerge as a predictor of anxiety. These assertions are supported by findings that emotion understanding is related to social anxiety in high, but not low abstract reasoning groups.

Emotion understanding correlated positively with verbal abilities. Examination of specific emotion understanding skills indicated that as verbal abilities increased, children's knowledge of cues of emotions and understanding of multiple emotions also increased. This finding extends to an older age group previous research demonstrating that emotion understandings skills are correlated positively with verbal ability in preschoolers (Bosacki & Moore, 2004). Analysis of sex differences found that boys reported more emotions than girls, which on the thought-listing task reflects less developed emotion understanding. This result also extends previous findings that preschool girls have better developed emotion understanding than do boys (Bosacki & Moore, 2004), indicating this difference persists into late childhood.

These findings may have implications for the use of cognitive-behavioral therapy (CBT) for child anxiety. CBT combines behavioral techniques with identification and change of maladaptive cognitions. Results from the current study indicate children with well-developed verbal skills have better emotion understanding and were more likely to report cognitions during hypothetical anxiety-provoking scenarios. In contrast, children with less developed emotion understanding were less able to differentiate between emotions and cognitions and reported emotions during these scenarios. Children who experience and report anxiety emotionally are more likely to confound their emotions and cognitions, which may make it difficult to alter negative cognitions using CBT. Furthermore, children with lower emotion understanding exhibited decreased verbal abilities and were less able to differentiate their thoughts, which may limit the appropriateness of cognitive-behavioral treatment. Assessing a child's emotion

understanding could help determine the appropriateness of cognitive behavioral therapy. Children with less developed emotion understanding and verbal abilities may respond better to strictly behavioral approaches that do not target changing cognitions.

Cognitions

One component of anxious cognitions in children is cognitive errors, which are a marker of general negative schemas. Committing anxiety-related cognitive errors was hypothesized to be associated positively with cognitive development. Although this relationship was not supported when examining abstract reasoning abilities, significant age effects were found. Older children committed more cognitive errors than did younger children. This finding supports previous research as well as the potential importance of cognitive errors in the development and maintenance of child anxiety.

Further examination of abstract reasoning by comparing extreme groups supported hypothesized differences. Cognitive errors predicted social anxiety but only in the high abstract reasoning group; this finding supports the hypothesis that the relationship between cognitive errors and anxiety varies based on cognitive development. As children develop cognitively, they attain the ability to generate multiple possible outcomes for a situation—positive and negative. Being able to think of more outcomes, therefore, increases the child's likelihood of selecting a negative outcome and committing cognitive errors. This assertion was supported by the predictive value of cognitive errors for social anxiety that was found only in the high abstract reasoning group.

Of note, cognitive errors only predicted social anxiety—not general anxiety. Onset of social phobia usually occurs during late childhood or early adolescence, in

contrast to the early adulthood onset seen for generalized anxiety disorder (Scheibe & Albus, 1992). It is possible, therefore, that current findings regarding general versus social anxiety reflect typical areas of worry for children. At younger ages, children's worries are more likely to be narrow in scope and particularly peer related due to the importance of social interactions versus global worries seen in adults. The measure used to assess cognitive errors presented children with scenarios—most of which had a social component. Therefore, it is also possible that cognitive errors about social situations were assessed in greater detail than cognitive errors about general situations.

The second cognitive component of child anxiety is cognitive content, which was examined by classifying cognitions reported on the thought-listing task as anxious or non-anxious. Differences in negative cognitions between the high and low abstract reasoning ability groups approached significance, suggesting children with increased cognitive capabilities reported more anxious cognitions. This finding is consistent with previous research as well as the current study's findings that cognitive errors were higher in the high abstract reasoning group. These results likely reflect the hypothesized relationship between the ability to think of numerous hypothetical outcomes and increased anxiety.

Cognitive Development

A difference was found for verbal abilities across data collection sites, which is not surprising given the nature of the settings. Specifically, fluid intelligence, measured by the non-verbal scale, is relatively free from the influence of education and experience (Rubin, Brown, & Priddle, 1978); therefore, ability differences between public, private,

and community programs would not be expected. Crystallized intelligence, however, is influenced to a greater degree by environmental advantages, which is evidenced by higher scores for children attending private school. The KBIT-2 used verbal and non-verbal scales to measure fluid and crystallized intelligence, respectively. Despite the difference in verbal skills, abstract reasoning did not vary between groups.

A positive correlation between cognitive development and anxiety has been previously established using Piagetian cognitive tasks (e.g., Carroll & Steward, 1984). Many Piagetian tasks categorize children as preoperational, transitional, or concrete operational thinkers. Although these tasks differ from standard intelligence measures, research indicates they are correlated positively (Rubin, Brown, & Priddle, 1978). Piagetian tasks purport to measure non-verbal and fluid intelligence (Rubin, Brown, & Priddle, 1978); the current study's use of the KBIT-2 non-verbal scale, therefore, corresponds well with a Piagetian framework. It is possible, however, that different methods of measurement could account for the lack of replication of Piagetian findings.

Examining differences between these methods highlights the limitations of Piagetian tasks. Critiques of Piaget's stage theory of cognitive development identify weaknesses that apply specifically to child anxiety. First, advancements in studying children's cognitions, such as findings regarding cognitive errors and natural reasoning are not accounted for by Piaget's theory. Results from the current study, as well as previous research, reflect the important relationship of cognitive errors to anxiety. As discussed previously, the relationship of emotion understanding to anxiety highlights possible influences of negative experiences, which may alter natural reasoning. Cognitive

errors and emotion understanding, therefore, relate to anxiety but are not encompassed in Piagetian theory. Second, Piagetian tasks often produce “false-negative conceptual diagnoses” that underestimate children’s cognitive abilities. Abstract reasoning abilities have been shown to emerge around 9 to 11 years—Piaget’s theory states that these thought structures emerge at 11 to 12 years (Halford, 1989). Although these age ranges are not widely discrepant, the current study’s sample may not have included enough young children.

Piagetian cognitive tasks do not directly tease apart effects of verbal and non-verbal development. Despite the hypothesized influence of abstract reasoning based on Piaget’s theory, correlations between measures of anxiety and verbal abilities were significant, whereas abstract reasoning abilities were not related to anxiety. Because Piagetian tasks do not assess verbal abilities, these important relationships could only be measured using standardized verbal and non-verbal tasks.

Verbal abilities contribute important information regarding the interplay of main study variables with general and social anxiety; one possible pathway of influence involves coping. Previous research linking cognitive abilities with coping indicates increased verbal abilities may counteract one’s susceptibility to anxiety due to increased abstract reasoning abilities (Plante & Sykora, 1994). Current hypotheses were derived from previous findings that increases in cognitive capabilities allow children to think about more possible outcomes, which may increase their likelihood of selecting negative events and increase anxiety. In contrast, well-developed verbal abilities could enable children to cope with their anxiety. For example, if a child can express his worries, then

he is more likely to receive support, probably decreasing his anxiety. Research in laboratory settings also relates anxiety to coping. When given feedback regarding incorrect performance on a task, children with anxiety often repeated their mistakes, whereas children with lower levels of anxiety used feedback productively (Toren et al., 2000).

Although verbal abilities may influence the development of anxiety in children, performance may also be affected negatively by anxiety. Anxiety can be conceptualized as an internal verbal task because it involves negative self-statements (e.g., Deffenbacher, 1986). Anxious thoughts, therefore, occupy a portion of limited working memory capacity and may lead to decreased performance (Markham & Darke, 1991).

Performance in children with anxiety is impaired on verbal tasks with high working memory demands, such as vocabulary and problem solving; in contrast, differences have not been found for non-verbal tasks (Toren et al., 2000). Results from the current study support previous research in this domain and suggest child anxiety is related specifically to performance on verbal tasks.

CHAPTER IV

CONCLUSIONS

General Conclusions

The current study examined the interplay of emotions, cognitions, and cognitive development in relation to child general and social anxiety. Results indicated that children with better developed verbal skills and emotion understanding may be less likely to experience negative situations that contribute to anxiety. In contrast, for children who do experience such situations, emotion understanding and verbal skills may facilitate coping and protect against the development of anxiety. Furthermore, confounding emotions and cognitions was related to experiencing increased social anxiety and possessing lower emotion understanding and verbal skills, which may be influenced by processing difficulties related to anxiety and verbal performance.

Limitations

Although this study had a number of strengths, a few limitations merit discussion. The ethnic composition of the sample was not diverse; however, it is representative of the specific sites where this study was conducted. In addition, use of a variety of settings resulted in a varied range of socioeconomic status

Between site differences, as discussed previously, are one limitation of the current study; these differences, however, seem to reflect the varied ages across sites. In addition, differences were only found across sites for verbal ability. The abstract reasoning abilities

of children did not differ between sites; therefore, these group differences should not affect the examination of cognitive development in relation to other variables.

This study examined emotion understanding, cognitive errors, cognitions reported, emotions reported, and cognitive development in relation to general and social anxiety. To examine the contribution of each variable, multiple statistical analyses were conducted. Conclusions are limited because no correction was computed to account for multiple comparisons.

An a priori power analysis was conducted based on using regression analyses. Most linear regression analyses were not significant, although some extreme group differences were. Therefore, a larger sample with more people in the extreme groups may better capture these relationships.

Future Research

Despite these limitations, the current study highlighted many important relationships regarding general and social anxiety in children. Sex differences identified in emotion understanding should be further examined specifically in relation to child anxiety. These differences have previously been found in pre-school aged children and existed for certain aspects of emotion understanding in the current age range of 6 to 13 years. Further research should focus on preschool to young elementary school aged children and examine specific differences and correlates of emotion understanding.

Current results suggest cognitive errors predict social anxiety but not general anxiety. One possible explanation of this finding relates to the social nature of the measure used to examine cognitive errors. Thus, development of a measure that

delineates specific cognitive errors for general versus social anxiety would be useful.

Furthermore, extending the age range to include young adulthood might identify shifts in the focus of anxiety over time.

This study measured cognitive development using the non-verbal measure of a standardized intelligence scale. Although theoretically supported by research indicating a strong correlation between Piagetian tasks and non-verbal intelligence scales, results using this measure did not correspond to hypothesized differences in anxiety based on cognitive development. Future research should combine multiple measures of cognitive development to better understand their relationship to each other and anxiety in children. Furthermore, based on age discrepancies across theories, a wider age range should be used to ensure capturing cognitive developmental transitions.

Previous findings indicating decreases in verbal performance are related to anxiety were supported by the current study. This study assessed anxiety using hypothetical scenarios, which are non-threatening situations. Decreases in performance on verbal tasks, therefore, were likely affected by children's trait levels of anxiety. The impact of anxiety on verbal performance in specific threatening situations (state anxiety) should be examined to determine implications and correlates of children's experience of anxiety.

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APPENDIX A. Tables

Table 1
Demographic information

Age	Number of Participants	Ethnicity	Number of Participants
6	2	Caucasian	80
7	11	African American	1
8	12	Latino	2
9	10	Biracial	1
10	16	Other	1
11	19		
12	6		
13	9		

Table 2
Scale means and standard deviations

Scale	<i>M</i>	<i>SD</i>
KBIT non-verbal raw	30.35	6.26
KBIT non-verbal standard	104.07	14.45
KBIT verbal raw	61.20	12.16
KBIT verbal standard	105.15	12.66
Social Anxiety (SPAI-C)	15.86	9.78
General Anxiety (MASC)	35.15	13.76
Cognitive Errors (CNCEQ)	6.09	4.09
Cognitions Reported	9.35	3.73
Emotions Reported	2.48	3.02
Skewness and Kurtosis for each scale < 1.		

Table 3

Multivariate and univariate analyses of variance for data collection sites

Source	Multivariate	Univariate		
	$F(6, 84)$	NV raw $F(2, 84)$	V raw $F(2, 84)$	Age $F(2, 84)$
Group	5.48**	.39	6.24**	8.02**

NVraw = non-verbal raw, Vraw = verbal raw

** $p < .01$

Table 4
Post hoc analyses for between group differences

Site	After school (1)		Public School (2)		Private School (3)		Post Hoc
	M	SE	M	SE	M	SE	
NVraw	28.7	1.9	30.5	1.2	30.6	.9	1 < 2, 3
Vraw	50.2	3.6	65.3	2.3	61.3	1.6	1 = 2 = 3
Age	9.2	.6	10.9	.4	9.3	.2	1 < 2 < 3

Table 5
Zero order correlations between study variables

	1	2	3	4	5	6	7	8	9	10
NV raw	---									
NV stand	.82**	---								
V raw	.59**	.22*	---							
V stand	.22*	.44**	.50**	---						
Soc Anx	-.12	-.13	-.27*	-.35**	---					
Gen Anx	-.03	.01	-.22*	-.23*	.57**	---				
Cog Err	-.10	-.26**	-.07	-.35**	.25*	.09	---			
EU	.13	.02	.22*	.08	.12	.14	-.04	---		
ER	-.12	-.03	-.23*	.04	.34**	-.09	-.03	-.28*	---	
CR	.13	.07	.22*	.01	-.39**	.09	.01	.32**	-.95**	---

NV raw = non-verbal raw, NV stand = non-verbal standard, V raw = verbal raw, V stand = verbal standard, Soc Anx = Social Anxiety, Gen Anx = General Anxiety, Cog Err = Cognitive Errors, EU = Emotion Understanding, ER = emotions reported, CR = cognitions reported

** $p < .01$, * $p < .05$

Table 6

General and social anxiety as predictors of emotions and cognitions reported

Variable	<u>B</u>	<u>SE B</u>	<u>β</u>
Criterion: Emotions Reported			
general anxiety	-.07	.03	-.32**
social anxiety	.14	.04	.44**
Criterion: Cognitions Reported			
social anxiety	-.16	.04	-.50**
general anxiety	.08	.03	.36**

** $p < .01$

Table 7
Predictors of reported emotions and cognitions

Variable	<i>B</i>	<i>SE B</i>	β
Criterion: reported emotions			
Ethnicity	.35	.48	.07
Sex	.91	.60	.15
Emotion Understanding	-1.98	.74	-.26**
General anxiety	-.06	.03	-.27*
Social anxiety	.12	.04	.39**
Criterion: reported cognitions			
Ethnicity	-.60	.47	-.05
Sex	-.76	.59	-.13
Emotion understanding	2.21	.73	.29**
Social anxiety	-.14	.04	-.46**
General anxiety	.07	.03	.32**

** $p < .01$, * $p < .05$

Table 8
Differences in cognitive errors between age groups

Group	Total		OG		CAT		PER		SEL ABS	
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
high age	6.89**	.73	1.69*	.20	1.64	.20	1.82*	.18	1.74**	.18
low age	4.83	.73	1.19	.20	1.18	.20	1.38	.18	1.07	.18

Total = total cognitive errors, OG = overgeneralization, CAT = catastrophizing, PER = personalizing, SEL ABS = selective abstraction

* $p < .01$, ** $p < .05$

Table 9
Cognitive errors predicting social and general anxiety

Variable	<u>B</u>	<u>SE B</u>	<u>β</u>
Criterion: social anxiety			
ethnicity	1.02	1.69	.07
sex	-.27	2.06	-.01
verbal	-.22	.11	-.28*
non-verbal	.15	.21	.09
cognitive errors	.59	.25	.25*
Criterion: general anxiety			
ethnicity	-.82	2.40	-.04
sex	-6.10	2.92	-.22*
verbal	-.37	.15	-.33*
non-verbal	.44	.30	.20
cognitive errors	.20	.36	.06

* $p < .05$

Table 10

Cognitive errors and cognitive development predicting social and general anxiety

Variable	<u>B</u>	<u>SE B</u>	<u>β</u>
Criterion: social anxiety			
Cognitive errors	-.64	1.28	-.27
Non-verbal	-.33	.28	-.21
Cognitive errors*non-verbal	.04	.04	.53
Criterion: general anxiety			
Cognitive errors	.74	1.87	.22
Non-verbal	.06	.42	.03
Cognitive errors*non-verbal	-.02	.06	-.16

Table 11

Cognitive errors predicting social anxiety in high abstract reasoning group

Variable	<u>B</u>	<u>SE B</u>	<u>β</u>
sex	.34	3.65	.03
verbal	-.29	.14	-.39*
emotion understanding	-2.89	4.26	.13
cognitive errors	1.13	.47	.44*

* $p < .05$